$\therefore\ x=\frac{1}{3}(5-1.48329)=\frac{1}{3}$ of $3.51671=1.17223$. $\therefore\ 100x=\$117.22\frac{3}{10}$, the price to be paid for a \$100-bond at 5%, interest payable quarterly for 10 years, to realize 3% per annum payable quarterly.

Also solved by *J. H. DRUMMOND, H. C. WHITAKER*, and *G. B. M. ZERR*.

NOTE:—Problem 19 was also solved by *J. H. DRUMMOND, M. A. GRUBER, T. L. DeLAND, J. F. W. SHEFFER, G. B. M. ZERR*, and *F. P. MATZ*.

PROBLEMS.

26. Proposed by ALVIN E. SCHMIDT, Winesberg, Ohio.

Show that $abc>(a+b-c)(a+c-b)(b+c-a)$ unless $a=b=c$.

27. Proposed by A. H. BELL, Hillsboro, Illinois. (The problem from H. C. WILKS, Skull Run, Virginia.

An oarsman in rowing a boat down stream 7 miles from A to B and then back requires 12 minutes longer time, than commencing from B, and rowing up and back; the rate of speed for the 1st half of the time is 5 miles per hour, and for the 2nd half of the time is $4\frac{1}{2}$ miles per hour. Required the current.

28. Proposed by H. W. DRAUGHON, Clinton, Louisiana.

The working capacity of a horse is constant between the ages of a and b years, and decreases at a constantly accelerated rate from the age of b years to that of c years, becoming 0 at the latter age. If the value of the horse at the age of a years is d, give a formula for finding his value at any subsequent time.

Solutions to these problems should be received on or before September 1st.

GEOMETRY.

Conducted by B.F.FINKEL, Kidder, Missouri. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

14. Proposed by HENRY HEATON, M. S., Atlantic, Iowa.

Through two given points to pass four circles tangent to two given circles.

Solution by the PROPOSER.

In the figure, C and C' the intersection of the common tangents to the two circles are known as the external and internal centers of similitude.

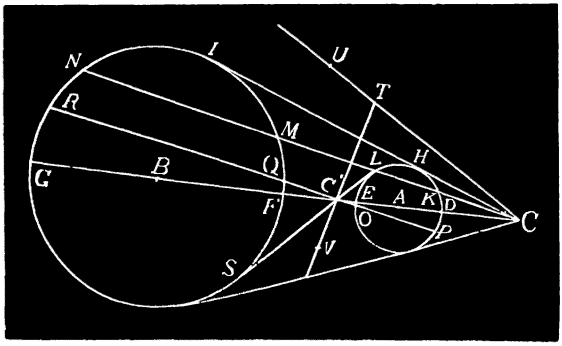
It is not necessary to demonstrate here the following well known properties:

I. If $CKLMN$ be any secant line from C, then $CL\times CM=CK\times CN=CH\times CI$.

II. If $POC'QR$ be any line through C', secant to both circles, $C'O\times C'R=C'Q\times C'P=C'L\times C'S$.

III. If any circle be drawn to which both circles are either internally or externally tangent, the line through the points of tangency will pass through the external center of similitude, C.

IV. If any circle be drawn to which one of the given circles is internally tangent, and the other externally tangent, the line joining the points of tangency will pass through the internal center of similitude, C'.



Let T be the given point. On the line through CT take a point U such that $CT\times CU=CH\times CI$. This may be done by passing a circle through I, T, and H. It will cut CT in U.

The circle to which both circles are either internally or externally tangent and which passes through T, will also pass through U.

This follows from I. and III.

If through U and T we pass two circles tangent to either of the given circles, (Prob. 17.) they will be tangent to the other.

On the line through $C'T$ take a point V such that $C'T\times C'V=C'S\times C'L$. This may be done by passing a circle through T, L, and S. It will cut $C'T$ in V.

The circle to which one of the given circles is tangent internally and the other externally and which passes through T will also pass through V. This follows from II. and IV.

If through V and T we pass a circle to which one of the given circles is internally tangent, the other will touch it externally and *vice versa*.

Excellent solutions received from *Professors G. B. M. ZERR, P. H. PHILBRICK*, and *H. C. WHITAKER*.

15. Proposed by ISAAC L BEVERAGE, Monterey, Virginia.

A man starts from the center of a circular 10 acre field and walks due north a certain distance, then turns and walks south-west till he comes to the circumference, walking altogether 40 rods. How far did he walk before making the turn?

Solution by Professor J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.

Let x be the first distance, y the second, and R the radius, then $x+y=40....(1)$ and $x^2+y^2-2xy\cos 45^\circ=R^2$, or $x^2-xy\sqrt{2}+y^2=R^2=\frac{1600}{\pi}....(2)$.